have been amended and the informalities have been eliminated. Therefore, Applicant respectfully requests the Examiner to withdrawal the rejection to claims 1 and 4.

The Examiner has rejected claims 1-4 and 9 under 35 U.S.C. §103(a) as being unpatentable over Ohmi et al. (U.S. 4,795,582). The Examiner states that unlike the claimed invention, the '582 reference does not teach less than 0.1% by weight of hydrofluoric acid, nor does the '582 reference teach more than 40%, but less than or equal to 47% by weight of ammonium fluoride. The Examiner states that since the prior art range is close enough that one skilled in the art would have been expected the prior art to have the same properties.

Applicant respectfully disagrees with the Examiner's statement. As shown in Table 1 on page 12 and Table 2 on page 13, as the ammonium fluoride concentration is increased from 39 to 45% by weight, the etching rate of the PL-TEOS or a thermal oxidation film are close to the etching rate of the natural oxidation film. Also, as shown in Table 3 on page 14 of the present application, as the ammonium fluoride concentration increases from 39 to 45% by weight, the widening of the contact holes formed in the O_3-TEOS film and the PL-TEOS film is suppressed and it is possible to obtain the designed hole diameter in the film.

When the etching rate of the PL-TEOS or the thermal oxidation film is close to the etching rate of the natural oxidation film, the surface of the wafer is very uniform with minimal surface

roughness and therefore allows for easy and accurate etching of the wafer. Furthermore, by suppressing the widening of the contact holes formed in the O_3-TEOS film and the PL-TEOS film, the surface of the wafer is uniform with minimal surface roughness and therefore allows for easy and accurate etching. If the widening of the contact holes is not suppressed, a substrate or polysilicon film at the bottom of the holes is subject to damage thereby impeding the most accurate etching of the wafer.

The '582 reference describes a hydrofluoric acid concentration of 0.1 to 10% by weight and an ammonium fluoride concentration of 15 to 40% by weight. As is shown in Tables 1 and 2 of the present application, a range of 40% and below by weight of ammonium fluoride causes the etching rate of the PL-TEOS or the thermal oxidation film to be far from the etching rate of the natural oxidation film. Having an etching rate far from the natural oxidation film rate is not desirable. When the etching rate of the PL-TEOS or the thermal oxidation film is not close to the etching rate of the natural oxidation film, the surface of the wafer is not uniform and will have a surface roughness that does not allow for easy and accurate etching of the wafer.

Furthermore, as shown in Table 3 of the present application, having a concentration of ammonium fluoride of 40% by weight or below will cause widening of the contact holes formed in the O_3-TEOS film and the PL-TEOS film and therefore damage is done to the designed hole diameters. The damage to the contact holes causes

the contact holes to be widened and therefore the surface of the wafer would not be uniform and would have a surface roughness that would not allow for easy and accurate etching. Since the range of the ammonium fluoride in the '582 reference does not cause the etching rate of PL-TEOS or the thermal oxidation film to be close to the etching rate of the natural oxidation film as taught by the data in Tables 1 and 2, the surface of the wafer would not be uniform and the surface roughness of the wafer would not allow for easy and accurate etching of the wafer as in the present application. Furthermore, since the range for the ammonium fluoride as described in the '582 reference would cause damage to the contact holes by widening the contact holes, the surface of the wafer in the '582 reference and would not be uniform and would have a surface roughness that would not allow for easy and accurate etching as in the present application. Therefore, Applicant respectfully submits that 0.1% by weight of hydrofluoric acid and more than 40%, but less that or equal to 47% by weight of ammonium fluoride makes a difference in the accuracy and ease of etching the wafer and therefore the claimed range does not have the same properties as the '582 reference.

Therefore, since the range for ammonium fluoride as described in the '582 reference would not provide the same properties as the claimed range of ammonium fluoride in the present application and such claimed range is not taught in the '582 reference, therefore Applicant respectfully requests the Examiner to withdrawal the

'103 rejection to claims 1-4 and 9. Claims 2, 3, 4 as amended, and claim 9 are either directly or indirectly dependent on amended claim 1, therefore, the dependent claims are patentably distinguishable over the '582 reference for at least the same reasons. Applicant respectfully requests the Examiner to withdrawal the 103 rejections to the claims.

Applicant respectfully requests the Examiner to withdrawal the objections and rejections to the claims and forward a Notice of Allowability to the undersigned.

If the Examiner has any questions or comments that would speed prosecution of this case, the Examiner is invited to call the undersigned at 260/485-6001.

Respectfully submitted,

Randall J. Knuth
Registration No. 34,644

RJK/ste8

Encs: Replacement Claims
Marked-up Claims
Petition for Extension of Time
Check No.6317 ($400)
Return Postcard

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Hon. Commissioner of Patents and Trademarks, Washington, D.C. 20231, on: August 15, 2002 .

Randall J. Knuth, Regis. No. 34,644
Name of Registered Representative

Signature

August 15, 2002
Date

Marked-Up Claims

IN THE CLAIMS:

Please amend claim 1 as follows:

1. A micromachining surface treatment material containing less than 0.1% by weight of hydrofluoric acid, and more than 40% by weight, but less than or equal to 47% by weight of ammonium fluoride.

2. The micromachining surface treatment material of Claim 1, manufactured by dissolving ammonia gas in a hydrofluoric acid solution.

3. The micromachining surface treatment material of Claim 1, containing a surfactant at 0.0001 to 1% by weight.

Please amend claim 4 as follows:

4. The micromachining surface treatment material of Claim 3, said surfactant is one of, or two or more of, a fatty amine ($C_nH_{2n+1}NH_2$; n=7 to 14), a fatty carboxylic acid ($C_nH_{2n+1}COOH$; n = 5 to 11), or a fatty alcohol ($C_nH_{2n+1}O[K]H$; n = 6 to 12).

5. A surface treatment method that removes a natural oxidation layer inside contact holes using the micromachining surface treatment material of Claim 1.

6. The surface treatment method of Claim 5, wherein the contact holes open to an oxidation film.

7. The surface treatment method of Claim 5, wherein the oxidation film is a CVD type oxidation film.